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09/749,916	12/29/2000	Jerome S. Hubacek	015290-457	6834

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EXAMINER

ALEJANDRO MULERO, LUZ L

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 09/23/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/749,916

Examiner

Luz L. Alejandro

Applicant(s)

HUBACEK ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 August 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 and 21-30 is/are pending in the application.
- 4a) Of the above claim(s) 24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10, 21-23 and 25-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 8/5/02 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- ~~If approved, corrected drawings are required in reply to this Office action.~~ *Ream 09/19/02*
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 7.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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DETAILED ACTION

Election/Restrictions

Newly submitted claim 24 is directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: a showerhead electrode is claimed in claim 10 which is patentably distinct from an electrode free of gas outlets

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claim 24 is withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Drawings

The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on 8/5/02 have been approved.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-10, 21-23 and 25-30 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time

the application was filed, had possession of the claimed invention. The specification, as originally filed, fails to provide support for a silicon electrode having a thickness of at least 0.3 inches.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-10, 21-23 and 25-30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1-line 3, the phrase "at least about" renders the claim indefinite (where there was close prior art and there was nothing in the specification, prosecution history, or the prior art to provide any indication as to what range of specific activity is covered by the term "about.", the term is indefinite, *Amgen, Inc. v. Chugai Pharmaceutical Co.*, 927 F.2d1200, 18 USPQ2d 1016 (Fed. Cir. 1991)).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 5-7, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murai, JP 2-20018.

Murai shows the invention substantially as claimed including a low resistivity electrode 2 adapted to be mounted in a parallel plate plasma reaction chamber 5 (see fig. 1) used in substrate processing, the electrode comprising: a single crystal silicon electrode having an electrical resistivity of less than 0.05 ohm-cm (see page 86, first column, lines 22-26), the electrode having an RF driven surface on one side thereof (see abstract) which is exposed to plasma.

Murai fails to expressly disclose the electrode having a thickness of at least 0.3 inches. However, a prima facie case of obviousness exists because where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device (see *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984)).

Claims 1-3, 5-7, 27, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al., U.S. Patent 5,993,597.

Saito et al. shows the invention substantially as claimed including a low resistivity electrode adapted to be mounted in a parallel plate plasma reaction chamber used in semiconductor substrate processing (see col. 1, lines 6-8), the electrode comprising: a single crystal silicon electrode having an electrical resistivity of 0.0001 ohm-cm (see abstract; col. 1, lines 64-65; col. 3, lines 65-67; examples 6-11 of Table 1; col. 4-line 65 to col. 5-line 5; col. 6, lines 10-15; and examples 4 and 7 of Table 2). Since the electrode is used in a parallel plate reactor, it is inherent that the electrode has a surface which is grounded or is coupled to RF power, the surface being exposed to plasma. Furthermore, the electrode comprises a plurality of bores having diameters of 0.5 mm, 0.020 inch, (see col. 3, lines 15-17, 56-57, and 65-66; col. 5, lines 1-3; and col. 6, lines 14-15). It is inherent, in view of this disclosure, that the electrode is being used as a showerhead electrode.

Saito et al. fails to expressly disclose the electrode having a thickness of at least 0.3 inches. However, a prima facie case of obviousness exists because where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device (see *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984)).

With respect to the outlets of the electrodes comprising ultrasonically drilled holes, this represents a process limitation which is not given patentable weight in a claim directed to a product.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murai, JP 2-20018 or Saito et al., U.S. Patent 5,993,597 in view of Machida et al., U.S. Patent 5,853,523 or Degner et al., U.S. Patent 5,074,456.

Murai and Saito et al. are applied as above but lack anticipation of disclosing that the electrode has heavy metal contamination of less than 10 ppm. Machida et al. (see col. 3, lines 57-60) and Degner et al. (col. 3, lines 52-64) disclose that in order to achieve high purity in an electrode the metal contamination should be less than 10 ppm. Therefore, in view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of the Murai and the Saito et al. reference as to comprise an electrode having a metal contamination of less than 10 ppm because this will lead to an electrode having high purity.

Claims 8-9, 21, and 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murai, JP 2-20018 in view of Degner et al., U.S. Patent 5,074,456 or Lilleland et al., U.S. Patent 6,073,577.

Murai is applied as above but lacks anticipation of disclosing the claimed bonding and clamping structures for securing the electrode to a support member. Degner et al. discloses a parallel plate plasma reactor in which the upper electrode can be secured to

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a support member by either a bonding member comprising a joint having an electrically conductive material between the electrode and the support member and which includes an electrically conductive filler (see col. 5, lines 3-17, col. 5-line 64 to col. 6-line 53) or by a clamping member (see col. 8, lines 10-18). Also, Lilleland et al. discloses a plasma processing apparatus in which the upper electrode is secured to a support member by bonding the electrode using an elastomeric joint as claimed claim 9 (see col. 3, lines 47-64 and col. 5-line 37 to col. 6-line 47). Furthermore, the reference discloses that in some cases the electrode can be mechanically clamped to the support member (see col. 5, lines 7-12). In view of these disclosures, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus disclosed by either Murai as to: 1) bond the electrode to the support member as claimed because, for example, the likelihood of breakage of the electrode or debonding from the support member is reduced as is the distortion, and the thermal contact is improved (see, for example, col. 9, lines 4-17 in the Lilleland et al. reference), or alternatively 2) as to use a clamping member because such structures are suitable and known for mechanically securing the electrode to the support member.

Claims 8-10, 21-23 and 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al., U.S. Patent 5,993,597 in view of Degner et al., U.S. Patent 5,074,456 or Lilleland et al., U.S. Patent 6,073,577.

Saito et al. is applied as above but lacks anticipation of disclosing the claimed bonding and clamping structures for securing the electrode to a support member.

Degner et al. discloses a parallel plate plasma reactor in which the upper electrode can be secured to a support member by either a bonding member comprising a joint having an electrically conductive material between the electrode and the support member and which includes an electrically conductive filler (see col. 5, lines 3-17, col. 5-line 64 to col. 6-line 53) or by a clamping member (see col. 8, lines 10-18). Also, Lilleland et al. discloses a plasma processing apparatus in which the upper electrode is secured to a support member by bonding the electrode using an elastomeric joint as claimed claim 9 (see col. 3, lines 47-64 and col. 5-line 37 to col. 6-line 47). Furthermore, the reference discloses that in some cases the electrode can be mechanically clamped to the support member (see col. 5, lines 7-12). In view of these disclosures, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus disclosed by either Saito et al. as to: 1) bond the electrode to the support member as claimed because, for example, the likelihood of breakage of the electrode or debonding from the support member is reduced as is the distortion, and the thermal contact is improved (see, for example, col. 9, lines 4-17 in the Lilleland et al. reference), or alternatively 2) as to use a clamping member because such structures are suitable and known for mechanically securing the electrode to the support member.

Saito et al. fails to expressly disclose the showerhead electrode securing structure of claim 10 and a backing plate elastomer bonded to the electrode as claimed in claim 22. Degner et al. and Lilleland et al. disclose a parallel plate plasma reactor in which a showerhead electrode is secured to a temperature controlled member in an interior of the plasma reaction chamber, the temperature controlled member including a

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gas passage for supplying a process gas to the showerhead electrode, a cavity and at least one baffle plate located in the cavity, the gas passage supplying process gas so as to pass through the baffle prior to passing through the showerhead electrode (see col. 7-line 54 to col. 8-line 39, and the figures of Degner et al.; and col. 3, lines 47-64 and fig. 1 of Lilleland et al.). In view of these disclosures, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the showerhead electrode of the apparatus disclosed by Saito et al. as to be bonded to a temperature controlled member as claimed because in such a way uniform distribution of the processing gases is achieved and the temperature of the electrode can be better controlled.

Furthermore, Degner et al. discloses a parallel plate plasma reactor in which the upper electrode can be secured to a support member by either a bonding member comprising a joint having an electrically conductive material between the electrode and the support member and which includes an electrically conductive filler (see col. 5, lines 3-17, col. 5-line 64 to col. 6-line 53). Also, Lilleland et al. discloses a plasma processing apparatus in which the upper electrode is secured to a support member by bonding the electrode using an elastomeric joint (see col. 3, lines 47-64 and col. 5-line 37 to col. 6-line 47). In view of these disclosures, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus disclosed by either Murai or Saito et al. as to bond the electrode to the support member as claimed because, for example, the likelihood of breakage of the electrode or

debonding from the support member is reduced as is the distortion, and the thermal contact is improved (see, for example, col. 9, lines 4-17 in the Lilleland et al. reference).

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murai, JP 2-20018 in view of Degner et al., U.S. Patent 5,074,456.

Murai is applied as above but fail to expressly disclose the backing plate being made of aluminum, aluminum alloy, silicon carbide, or graphite. Degner et al. discloses a backing plate which can be made of aluminum, graphite, stainless steel, copper or other materials (see col. 5-lines 15-17). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the electrode of Murai to include a backing plate constructed of, for example, aluminum or graphite, because this will allow for the backing plate to be readily machinable.

Claims 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al., U.S. Patent 5,993,597 in view of Degner et al., U.S. Patent 5,074,456.

Saito et al. is applied as above but fail to expressly disclose the backing plate being made of aluminum, aluminum alloy, silicon carbide, or graphite. Degner et al. discloses a backing plate which can be made of aluminum, graphite, stainless steel, copper or other materials (see col. 5-lines 15-17). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the electrode of Saito et al. to include a backing plate constructed of, for

example, aluminum or graphite, because this will allow for the backing plate to be readily machinable.

Also, Saito et al. fail to expressly disclose the backing plate being made of aluminum, aluminum alloy, silicon carbide, or graphite. Degner et al. discloses a backing plate which can be made of aluminum, graphite, stainless steel, copper or other materials (see col. 5-lines 15-17). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the electrode of Murai or Saito et al. to include a backing plate constructed of, for example, aluminum or graphite, because this will allow for the backing plate to be readily machinable.

Response to Arguments

Applicant's arguments with respect to claims 1-10, 21-23 and 25-30 have been considered but are moot in view of the new ground(s) of rejection.

Additionally, with respect to amending claim 1 to include the electrode having a thickness of at least 0.3 inches, such limitation raises the issue of new matter (as stated in this office action) because support only exists in the specification for as low as 0.375 inches, and it is not appropriate to round off 0.375 inches to 0.3 inches in the claim.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 703-305-4545. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 703-308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-

0661.

LLAM

LLAM

September 19, 2002

[Signature]
GREGORY MILLS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700